**Claims**

1. A kit of parts for varying magnetic field characteristics generated from a magnetic assembly for an active speed sensor comprising:

a generally tubular magnet that generates a magnetic field; and

a plurality of pole pieces insertable in the generally tubular magnet having respective dimensions for varying the magnetic field.

2. An active speed and position sensor comprising:

a sense element for sensing a magnetic field;

a generally tubular magnet that generates the magnetic field; and

a plurality of pole pieces insertable in the generally tubular magnet having respective dimensions for varying the magnetic field.

3. The apparatus of claim 2, wherein the sense element comprises a Hall Effect or a Magneto-Resistor sensor.

4. The apparatus of claim 2, wherein the generally tubular magnet comprises a shape of a cylinder, a square, a rectangle, or an ellipsoid.

5. The apparatus of claim 2, wherein the plurality of pole pieces comprises a cylindrical core coupled perpendicularly to a pole plate.

6. The apparatus of claim 5, wherein the cylindrical core is positioned coaxially in a center of the tubular magnet.

7. The apparatus of claim 5, wherein the pole plate couples to a pole of the tubular magnet.

8. The apparatus of claim 5, wherein the cylindrical core is cylindrically shaped or taper shaped.

9. The apparatus of claim 5, wherein the pole plate is cylindrically shaped or taper shaped.

10. The apparatus of claim 5, wherein the cylindrical core comprises a soft, highly permeable magnetic material.

11. The apparatus of claim 5, wherein the pole plate comprises a soft, highly permeable magnetic material.

12. The apparatus of claim 2, wherein the generally tubular magnet is polarized.

13. A magnetic assembly apparatus for use in active speed sensors for varying magnetic field characteristics comprising:

a generally tubular magnet; and

a plurality of pole pieces insertable in the tubular magnet having respective dimensions for varying a magnetic field.

14. The apparatus of claim 13, wherein the generally tubular magnet comprises a shape of a cylinder, a square, a rectangle, or an ellipsoid.

15. The apparatus of claim 13, wherein the plurality of pole pieces comprises a cylindrical core coupled perpendicularly to a pole plate.

16. The apparatus of claim 15, wherein the cylindrical core is positioned coaxially in a center of the tubular magnet.

17. The apparatus of claim 15, wherein the pole plate couples to a pole of the generally tubular magnet.

18. The apparatus of claim 15, wherein the cylindrical core is cylindrically shaped or taper shaped.

19. The apparatus of claim 15, wherein the pole plate is cylindrically shaped or taper shaped.

20. The apparatus of claim 15, wherein the cylindrical core comprises a soft, highly permeable magnetic material.

21. The apparatus of claim 15, wherein the pole plate comprises a soft, highly permeable magnetic material.

22. The apparatus of claim 13, wherein the generally tubular magnet is polarized.

23. A method for varying magnetic field characteristics generated from a magnetic assembly for an active speed sensor, comprising:

coupling a plurality of pole pieces inserted into a generally tubular magnet;

varying dimensions of the plurality of pole pieces; and

generating a varying magnetic field via the plurality of pole pieces.

24. The method of claim 23, wherein the generally tubular magnet comprises a shape of a cylinder, a square, a rectangle, or an ellipsoid.

25. The method of claim 23, wherein the plurality of pole pieces comprises a cylindrical core coupled perpendicularly to a pole plate.

26. The method of claim 25, wherein the cylindrical core is positioned coaxially in a center of the tubular magnet.

27. The method of claim 25, wherein the pole plate couples to a pole of the tubular magnet.

28. The method of claim 25, wherein the cylindrical core is cylindrically shaped or taper shaped.

29. The method of claim 25, wherein the pole plate is cylindrically shaped or taper shaped.

30. The method of claim 25, wherein the cylindrical core comprises a soft, highly permeable magnetic material.

31. The method of claim 25, wherein the pole plate comprises a soft, highly permeable magnetic material.

32. The method of claim 23, wherein the generally tubular magnet is polarized.